



Assessment of Student's Academic Achievement by Flipped Classroom Model and Traditional Lecture Method

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Abstract: *In recent years, a new learning approach called “Flipped classrooms model” has been stated as an effective way of learning. In this study, a statistical approach for the comparison of traditional lecture method and Flipped classrooms model has been performed for the academic performance of students in 6th and 7th semesters in the subject of Psychology. The study comprised of two semesters (32 weeks). The students in the 6th semester learned by traditional lecture method while in the 7th semester, students used the Flipped classroom model. The students and subject were the same in both the semesters. The statistical analysis showed that 7th semesters students learned by “Flipped classrooms model” achieved better academic performance than the 6th-semester students learned by traditional lecture method. The t-test analysis showed that the students learned by Flipped classroom model have effect size 3% more than academic achievements of students learned by traditional lecture method.*

Key Words: Academic Achievement, Flipped Classroom Model, Psychology, SPSS, Traditional Lecture Method.

Introduction

Learning is a basic need of humanity and a key element for the development of a nation ([Hafeez et al., 2020](#)). The participation of teacher in education development is not only to exist and transfer information but also to guide and facilitate the learner ([Hashemifardnia, Namaziandost, & Sepehri, 2019](#)). It is stated by ([Bergmann & Sams, 2012](#)) that utilization of Flipped classrooms model is useful as the mode of students learning is revisited, and this method of learning improved the learning outcomes of the learners. The students learnt by Flipped classrooms model made them lifelong learners. ([Tomas, Doyle, & Skamp, 2019](#)) observed that application of Flipped classrooms model produce motivation, inspires the students and increases their interests in studies. The practice of Flipped classrooms model as a substitute to the traditional lecture method has been gradually increasing the attention of scholars and instructors. The improvement in ICT devices such as collaborative classroom activities and interactive videos paves the means for extensive application of the flipped classroom model ([Johnston, 2017](#)). According to ([Arfstrom & Network, 2013](#)), the Flipped classrooms model of instruction is used to construct an interactive and active learning environment in the class and one of the best model of learning by using technology. Many researchers including (Davies, Dean, & Ball, 2013) stated that the Flipped classrooms model is now being used in various disciplines like science and engineering, mathematical education, social sciences and humanities, medical and engineering and English composition. The Flipped classrooms learning is a new instructional learning model where the instructor's shares planned digital learning resources with the students through any digital media outside the class.

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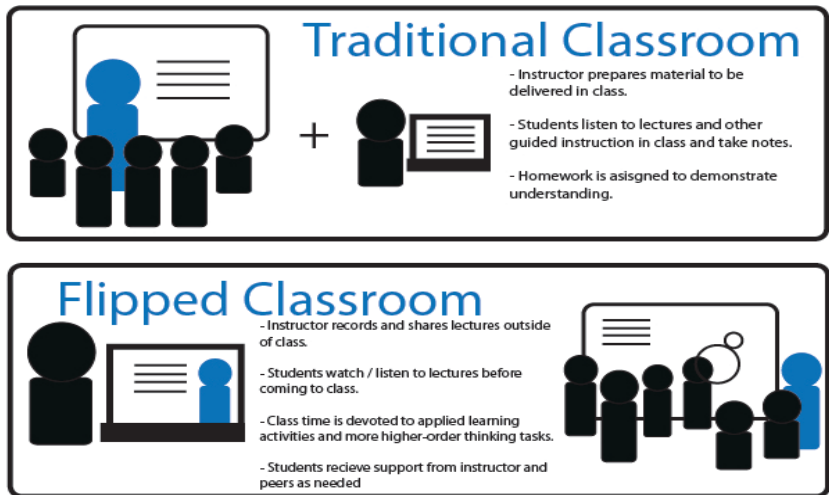


Figure 1: Pictorial view of the Flipped Classroom Model and Traditional Classroom

The related study material is also shared with this media by asynchronous communication (Bergmann & Sams, 2012). The interactive, dynamic and cooperative Problem-Based learning activities to solve the real-life problems are carried out in the classroom (Toto & Nguyen, 2009). The studies carried out by (Basal, 2015) showed that videos and Learning Management System (LMS) are usually applied as the mode of learning outside the class. By using the recently developed technology, the teachers make videos and study materials and then put these materials on the internet and University LMS account available in the classroom and outside the classroom (Sherer & Shea, 2011).

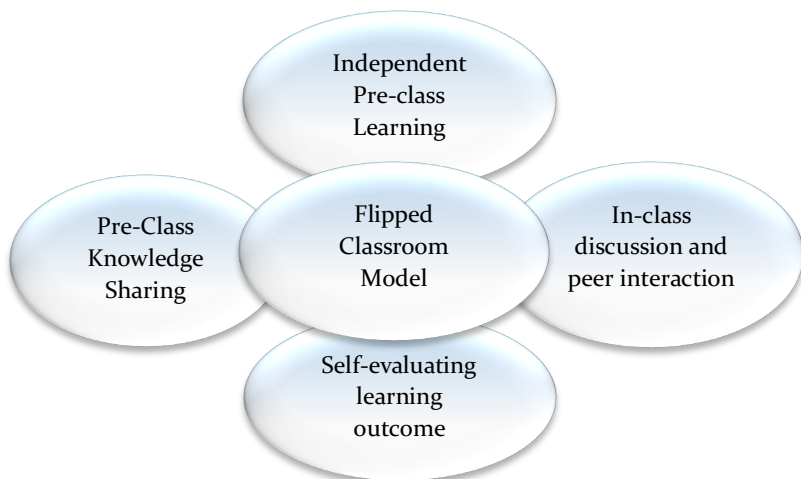


Figure 2: Structural Framework of the Flipped Classroom Model of Instruction

Many statistical studies, including (Milman, 2012) have been done on the Flipped classroom model to prove its effective way of learning. (Bishop & Verleger, 2013) proposed that Flipped classrooms model is a pedagogy technique which is based on the application of information technology such as LMS and video games and involvement of learning activities dynamically.

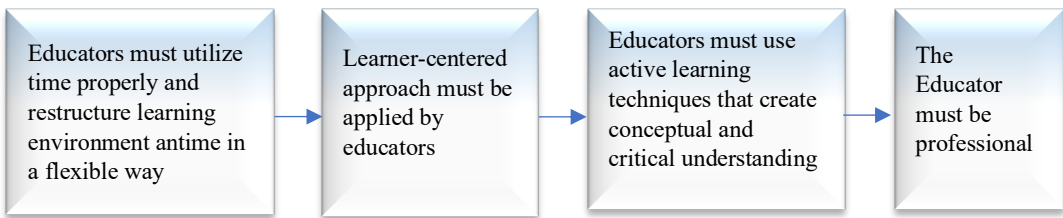


Figure 3: Learning components in Flipped Classrooms model of Learning ([Network, 2014](#))

Learning established in a Flipped classroom model happens when learners prepare the lectures by pre-recorded videos and notes uploaded on the LMS account ([Pierce & Fox, 2012](#)). The important principle of Flipped classroom model is to confirm enhanced understanding and course content learned by learners in and outside the classroom ([Herreid & Schiller, 2013](#)). The objective of this investigation is to statistically evaluate the academic achievement of learners in 6th and 7th semesters, followed by a traditional lecture method and Flipped classroom model in the subject of Psychology.

Review of Literature

For many years, the instructors have used the traditional lecture method in the classrooms, and the students followed up the lecture with homework ([Abedi, Keshmirshakan, & Namaziandost, 2019](#)). The traditional lecture method makes the learners passive in getting knowledge as compared to the Flipped classroom model as it makes creators. Knowledge becomes viable when there is dynamic participation in the learning process, and communications happen between the components of learning practice ([Abedi, Keshmirshakan, et al., 2019](#)). Many researchers, including ([Ash, 2012](#); [Shakibaei, Namaziandost, & Shahamat, 2019](#)) stated that a lot of instructors had moved away from traditional lecture methods. In the traditional learning method, the learners are required to just submissively attend and listen to the teacher's lecture and then gather facts from the notes. This method of teaching has been exposed to be unproductive for learners in the present era ([Abedi, Namaziandost, & Akbari, 2019](#)) ([Brunsell & Horejsi, 2013](#)). Positive results have been stated by those teachers who have assimilated the Flipped classroom model. The Learners were noted to be more active in solving real-life problems ([Roach, 2014](#)) ([Lai & Hwang, 2016](#)). It is stated that the students were involved in a self-learning procedure in the Flipped classrooms model ([Sohrabi & Iraj, 2016](#)). ([Hew & Lo, 2018](#)) conducted 28 revisions equating the flipped classrooms model of instruction to the traditional method of teaching in Nursing. The statistical results show that the Flipped classroom model has 0.33% more significant value than the traditional lecture-based classroom. ([Chen et al., 2018](#)) reviewed 46 empirical researches in the field of non-health and health contexts. Their conclusions that Flipped classroom model has 0.47% more significant value than the traditional lecture-based classroom. ([Gillette et al., 2018](#)) acknowledged five revisions in the perspective of medicinal education and concluded that there is no significant relation between the flipped classrooms model of instruction and traditional lecture method on last examination grades.

Flipped Classroom model of Instruction and Students' Academic Achievements

In the current era, several researches have concentrated on the influences of flipped classrooms model of learning on the academic achievements of learners. ([Zengin, 2017](#)) conducted research to create Flipped classroom learning environment in Khan Academy and by using open-source mathematical software. The objectives of this research were to inspect the impacts of flipped classrooms model of instruction on the academic achievements of students and expose the opinions about the application of flipped classrooms model of instruction. There were 28 participants in research in the subject of Mathematics. The conclusions of the study showed that the flipped classrooms model environment created by Mathematical software and Khan Academy increased students' academic achievements two times more than that the traditional lecture method.

(Zhonggen & Guifang, 2016) directed an investigation to explore the efficiency of Flipped classrooms model on English reading and writing courses by using the mix method approach. The data is collected on the bases of satisfaction, a test on Business English course and interview. The results of the study showed that the members learned on the basis of flipped classrooms model scored higher grades than the members learned by traditional lecture method. To demonstrate the efficiency of the flipped classroom model of learning, (Janatha, 2016) inspected to what level flipped classrooms model affected the students' academic achievements in nursing course. The consequences of the revision exposed that the learners learned on the basis of Flipped classrooms model scored higher grades as compared to the students learned by traditional lecture method.

Research Methodology

Research has been conducted for statistical comparison of academic achievements of students learned by Flipped classroom model and traditional method of teaching in 6th and 7th semesters in Psychology course contents at the Department of Psychology in Ghazi University Dera Ghazi Khan, Punjab, Pakistan. In 6th semester the students learned by traditional lecture method while in the 7th semester, the students used the Flipped classroom model for learning. The number of students in each semester was 20, and the subject was the same in both semesters. The University LMS account was used for online learning in the Flipped classroom model of instruction. This study comprises of two semesters (32 weeks). The learning process by traditional lecture method and Flipped classroom model used by the students is shown in figure.4.

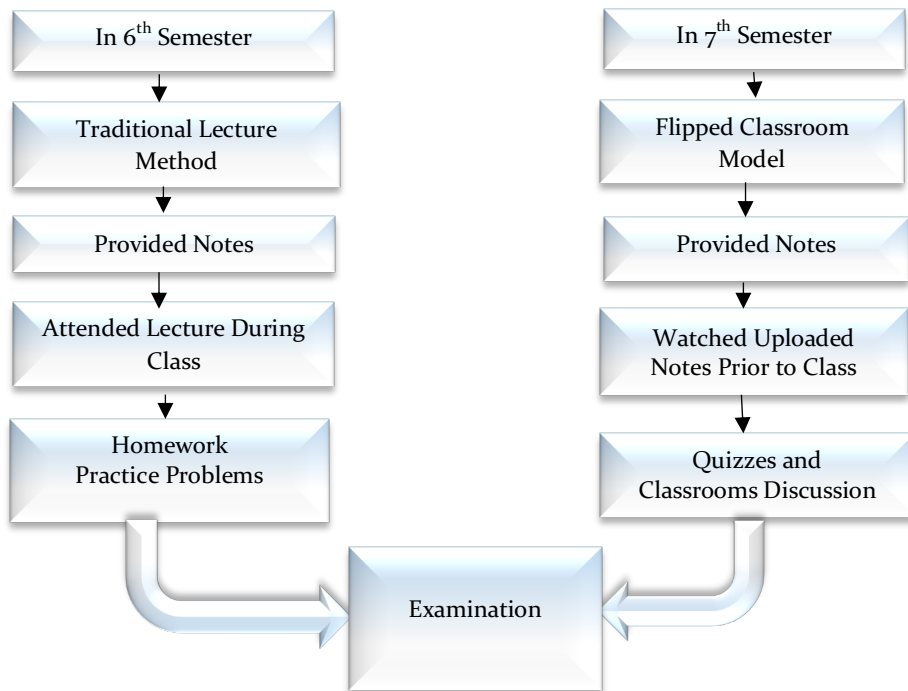


Figure 4: Flow Chart of Traditional Lecture Method and Flipped Classroom Model Used in this Study

Data Collection

The data of students of 6th and 7th semesters are collected from the Department of Psychology, Ghazi University, Dera Ghazi Khan, Punjab Pakistan. The data consists of the academic results of 6th and 7th semesters of the students of Psychology followed by a traditional method of teaching in 6th semester and

Flipped classroom model of instruction in 7th semester. The data is then analysed statistically. The collected data is presented in Table 1.

Table 1. The Students' Academic Achievements in 6th and 7th Semesters

S. No	6 th semester	7 th semester
1	2.89	3.02
2	3.35	3.56
3	3.21	2.95
4	3.29	3.79
5	3.41	3.91
6	2.97	3.25
7	3.11	3.17
8	3.39	3.93
9	3.19	3.73
10	3.25	2.99
11	3.27	3.44
12	2.74	3.23
13	3.43	3.63
14	3.37	3.51
15	2.88	3.32
16	3.23	3.37
17	3.42	3.61
18	2.54	2.67
19	2.33	2.79
20	3.05	3.22

Statistical Analysis

The students' academic achievement obtained by the flipped classroom model and the traditional method of teaching has been analysed by the statistical tools. The statistical tools Difference (df), Mean (M), Standard Error (SE), standard deviation (SD) and Coefficient of Determination (R^2) have been used for the analysis of the results. The t-test analysis is also presented for the academic achievement of semesters 6th and 7th at a significance level of 0.05.

Results and Discussion

The academic achievements of students in 6th and 7th semesters followed by a traditional lecture method and Flipped classroom model of learning have been analysed statistically. The statistical findings are illustrated in table 2. The academic achievements of students have a mean value from 2.56 to 3.66. The difference (df) of academic achievements of 6th and 7th semesters students range from -0.26 to 0.54. The standard error of estimation also calculated between the academic achievements of students of both semesters. The standard error (SE) values between range from 0.03 to 0.27. The more the difference between the academic achievements of semesters 6th and 7th, more was the standard error and vice versa. The standard deviation (SD) of academic achievement between 6th and 7th-semester students were also calculated. The standard deviation (SD) value ranges from 0.04 to 0.38. It also shows that when the differences between the academic achievements of both semesters are less, then standard deviation is also less and vice versa. So from the statistical table, it can be easily concluded that the Flipped classrooms model of learning is more effective than to the traditional lecture method.

Table 2. Statistical analysis of academic achievements of students in 6th and 7th semesters

S. No	6 th semester	7 th semester	Mean	df	SE	SD
1	2.89	3.02	2.955	0.13	0.065	0.091
2	3.35	3.56	3.455	0.21	0.105	0.14
3	3.21	2.95	3.08	-0.26	0.13	0.18
4	3.29	3.79	3.54	0.5	0.25	0.35
5	3.41	3.91	3.66	0.5	0.25	0.35
6	2.97	3.25	3.11	0.28	0.14	0.19
7	3.11	3.17	3.14	0.06	0.03	0.042
8	3.39	3.93	3.66	0.54	0.27	0.38
9	3.19	3.73	3.46	0.54	0.27	0.38
10	3.25	2.99	3.12	-0.26	0.13	0.18
11	3.27	3.44	3.355	0.17	0.085	0.12
12	2.74	3.23	2.985	0.49	0.245	0.34
13	3.43	3.63	3.53	0.2	0.1	0.14
14	3.37	3.51	3.44	0.14	0.07	0.09
15	2.88	3.32	3.1	0.44	0.22	0.311
16	3.23	3.37	3.3	0.14	0.07	0.098
17	3.42	3.61	3.515	0.19	0.095	0.13
18	2.54	2.67	2.605	0.13	0.065	0.091
19	2.33	2.79	2.56	0.46	0.23	0.32
20	3.05	3.22	3.135	0.17	0.085	0.12

The linear regression model is applied between the academic achievements of students in 6th and 7th semesters followed by the traditional lecture method and flipped classroom model of learning. The linear regression model between the academic achievements of students shows that the value of the coefficient of determination (R^2) is 0.5784. This shows a significant correlation between the academic achievements of students in 6th and 7th semesters, followed by a traditional method of teaching and Flipped classroom model of learning.

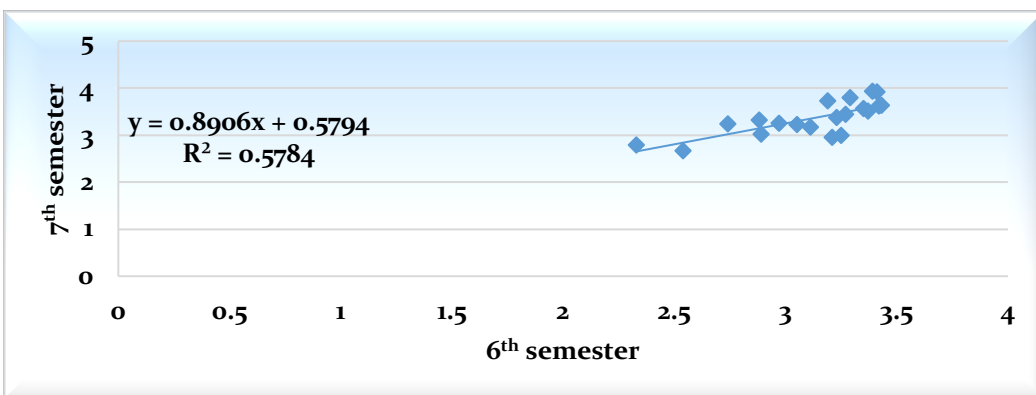


Figure 5: Linear Regression Model for Academic Achievements of students in 6th and 7th semesters

T-Test Analysis

The T-test analysis has been done for the academic achievements of students in 6th and 7th semesters followed by a traditional lecture method and flipped classroom model of instruction at a significance level of 0.05. The outcomes of t-test analysis of students' academic achievements in 6th and 7th semesters have been illustrated in table 3 and 4. The results of the t-test analysis show that there is a significant correlation between the academic achievements of students in 6th and 7th semesters. The difference among the individual learner and mean of the total learners in academic achievements in 6th semester varies from -0.79 to 0.29. Similarly, the difference among the individual learner and mean of the total learners in 7th semester varies from -0.68 to 0.58. The t-value for each semester is -2.25. The p-value is 0.03, which shows that the flipped classrooms model of instruction is 3% more significantly effective than the traditional method of teaching at a significant level of 0.05 i-e: $p < 0.05$. So, it is concluded that the flipped classrooms model of instruction is a more effective way of learning than the traditional method of learning. The findings of this research also proved the previous flipped based revisions.

Table 3. T-Test Analysis of Academic Achievements of 6th Semester Students

6 th semester	Diff (X - M)	Sq. Diff (X - M) ²
2.89	-0.23	0.05
3.35	0.23	0.05
3.21	0.09	0.01
3.29	0.17	0.03
3.41	0.29	0.09
2.97	-0.15	0.02
3.11	-0.01	0
3.39	0.27	0.08
3.19	0.07	0.01
3.25	0.13	0.02
3.27	0.15	0.02
2.74	-0.38	0.14
3.43	0.31	0.1
3.37	0.25	0.06
2.88	-0.24	0.06
3.23	0.11	0.01
3.42	0.3	0.09
2.54	-0.58	0.33
2.33	-0.79	0.62
3.05	-0.07	0

N=20 Statistically significance at the 0.05 level.

Table 4. T-Test Analysis of Academic Achievements of 7th Semester Students

7 th semester	Diff (X - M)	Sq. Diff (X - M) ²
3.02	-0.33	0.11
3.56	0.21	0.04
2.95	-0.4	0.16
3.79	0.44	0.19
3.91	0.56	0.31
3.25	-0.1	0.01
3.17	-0.18	0.03
3.93	0.58	0.33
3.73	0.38	0.14
2.99	-0.36	0.13
3.44	0.09	0.01

3.23	-0.12	0.02
3.63	0.28	0.08
3.51	0.16	0.02
3.32	-0.03	0
3.37	0.02	0
3.61	0.26	0.07
2.67	-0.68	0.47
2.79	-0.56	0.32
3.22	-0.1	0.02

N=20 Statistically significance at the 0.05 level.

Conclusion

A statistical comparison of academic achievements of students in 6th and 7th semesters in the subject of Psychology followed by a traditional method of teaching and flipped classroom model of instruction has been performed in this study. The students in 6th semester used the traditional method of teaching while in 7th semesters, they used the flipped classroom model of learning. The students and subject were the same in both semesters. The findings of the research revealed that there is a significant correlation between the academic achievements of students in 6th and 7th semesters. The flipped classroom model of instruction has 3% more significant value than the traditional method of learning. This study proved the previous studies in favour of flipped classrooms model of learning. So, it is recommended that flipped classrooms model of instruction must be followed for better academic achievement.

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